

Clostridium

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Clostridium is a genus of Gram-positive bacteria, belonging to the Firmicutes. They are obligate anaerobes capable of producing endospores.^[1] Individual cells are rod-shaped, which gives them their name, from the Greek *kloster* or spindle. These characteristics traditionally defined the genus, but they are not phylogenetically significant; many species originally classified as *Clostridium* have been reclassified in other genera.

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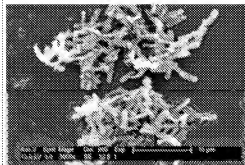
Pathology

Clostridium includes common free-living bacteria as well as important pathogens.^[2] There are four main species responsible for disease in humans:

- *C. botulinum*, an organism producing a toxin in food/wound that causes botulism.^[3]
- *C. difficile*, which can overgrow other bacteria in the gut during antibiotic therapy, can cause pseudomembranous colitis.^[4]
- *C. perfringens*, causes a wide range of symptoms, from food poisoning to gas gangrene. Also responsible for enterotoxemia (also known as "overeating disease" or "pulpy kidney disease") in sheep and goats.^[5]
- *C. tetani*, the causative organism of tetanus.^[6]

Honey sometimes contains *Clostridium botulinum* bacteria, which may cause infant botulism in humans one year old and under. The bacteria produce botulinum toxin, which eventually paralyzes the infant's breathing muscles.^[7] *C. sordellii* has been linked to the deaths of more than a dozen women after childbirth.

Clostridium



SEM micrograph of *Clostridium difficile* colonies from a stool sample.

Scientific classification

Kingdom: Bacteria
 Phylum: Firmicutes
 Class: Clostridia
 Order: Clostridiales
 Family: Clostridiaceae
 Genus: *Clostridium*
 Prazmowski 1880

Species

C. acetobutylicum
C. aerotolerans
C. beijerinckii
C. bifementans
C. botulinum
C. butyricum
C. chauvoei
C. colicanis
C. difficile
C. formicaceticum
C. ljungdahlii
C. laramie
C. novyi
C. perfringens
C. piliforme
C. sordellii
C. sporogenes
C. tetani
C. tyrobutyricum

Commercial uses

C. thermocellum can utilize lignocellulosic waste and generate ethanol, thus making it a possible candidate for use in ethanol production. It also has no oxygen requirement and is thermophilic, reducing cooling cost. *C. acetobutylicum*, also known as the *Weizmann organism*, which was first used by Chaim Weizmann to produce acetone and biobutanol from starch in 1916 for the production of gunpowder and TNT.

The anaerobic bacterium *C. ljungdahlii*, recently discovered in commercial chicken wastes, can produce ethanol from single-carbon sources including synthesis gas, a mixture of carbon monoxide and hydrogen that can be generated from the partial combustion of either fossil fuels or biomass. Use of these bacteria to produce ethanol from synthesis gas has progressed to the pilot plant stage at the BRI Energy facility in Fayetteville, Arkansas.^[8]

References

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- [^] Wells CL, Wilkins TD (1996). *Clostridia: Sporeforming Anaerobic Bacilli in: Baron's Medical Microbiology (Baron S et al. eds.)* (<http://www.ncbi.nlm.nih.gov/books/bv.fcgi?rid=mmed.section.1050>), 4th ed., Univ of Texas Medical Branch. ISBN 0-9631172-1-1.
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- [^] Wells CL, Wilkins TD (1996). *Other Pathogenic Clostridia Food Poisoning and Clostridium perfringens in: Baron's Medical Microbiology (Baron S et al. eds.)* (<http://www.ncbi.nlm.nih.gov/books/bv.fcgi?rid=mmed.section.1131>), 4th ed., Univ of Texas Medical Branch.
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- [^] Tanzi MG, Gabay MP (2002). "Association between honey consumption and infant botulism". *Pharmacotherapy* 22 (11): 1479-83. doi:10.1592/phco.22.16.1479.33696 (<http://dx.doi.org/10.1592/phco.22.16.1479.33696>). PMID 12432974 (<http://www.ncbi.nlm.nih.gov/pubmed/12432974>).
- [^] Providing for a Sustainable Energy Future (<http://www.brienergy.com/>). Bioengineering Resources, inc. Retrieved on 21 May, 2007.

External links

- Todar's Online Textbook of Bacteriology (<http://textbookofbacteriology.net/clostridia.html>)
- UK *Clostridium difficile* Support Group (<http://www.cdifff-support.co.uk/>)
- Pathema-*Clostridium* Resource (<http://pathema.jcvi.org/cgi-bin/Clostridium/PathemaHomePage.cgi>)
- Water analysis: Clostridium video (<http://www.tgw1916.net/movies.html>)

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